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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 18

Application Number: 09/489,514
Filing Date: January 21, 2000
Appellant(s): NARAYANAN ET AL.

Dorothy P. Whelan
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed December 10, 2002.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The brief does not contain a statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief. Therefore, it is presumed that there are none. The Board, however, may exercise its discretion to require an explicit statement as to the existance of any related appeals and interferences.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

The rejection of claims 7-20 stand or fall together as stated by appellant.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,677,074	Serpico et al.	10-1997
5,992,008	Kindler	11-1999

4,524,114 Samuels et al. 6-1985

Dupont Zonyl fluoroadditives Ink and Coating Guide, 1997, pp. 1-4, available at: http://www.dupont.com/teflon/fluoroadditives/products/index.html

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Issue 1: Claims 7-11, 13, 14, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Serpico et al. in view of Dupont Zonyl reference.

Serpico teaches a process for making a catalyst ink for a fuel cell comprising mixing at room temperature water and particles of a fluorocarbon polymer with a particle size of 0.05 microns to 500 microns. (col. 2 line 42-43) The catalytic material comprises Pt, *inter alia*. (col. 4 line 19) The fluoropolymers comprise polytetrafluoroethylene, *inter alia*. (col. 4 line 48) The catalyst ink also includes an ionomer. (col. 3 line 58 *et seq*) The catalyst ink, once applied to a membrane, is bonded to an electrode. (col. 6 line 50 *et seq*)

While Serpico discloses a particle size range of 0.05 microns to 500 microns, it is worth noting that in Example 1 of the patentees' disclosure and the subsequent example thereto, the PTFE dispersion is specifically referenced as Dupont Teflon 30B. (col. 6 line 35) Dupont Teflon 30B has been established throughout the prosecution of this application to have a particle size of 0.05 microns to 0.5 microns. (col. 6 line 35, see Dupont Teflon PTFE 30B Product Information Guide, of record) Notwithstanding the smaller particle size for the PTFE fluoroadditive albeit at 0.5 micron in size, while Serpico does not explicitly teach a particle size of 1 to 4 microns, the Dupont Zonyl reference teaches PTFE fluoroadditives polymers wherein the particle size thereof is a result-effective variable. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980) In the

Dupont Zonyl reference, the size of the PTFE fluoroadditives are shown to be result-effective as the size of the particles directly affects dispersion stability of the fluoroadditive formulation. (pg. 1 under "Ink and OPV Product Recommendations") Ultimately, the dispersion stability affects the wear agent performance, i.e. durability of the fluoroadditive on its substrate.

Issue 2: Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Serpico et al. in view of Dupont Zonyl reference as applied to claims 7-11, 13, 14, 18, and 20 above, in view of Kindler.

The teachings of Serpico and the Dupont Zonyl reference are discussed above.

Serpico does not explicitly teach a second ionomer comprising a liquid copolymer of tetrafluoroethylene and perfluorovinylethersulfonic acid. However, Kindler teaches such a liquid copolymer. (col. 3 lines 36-38, col. 6 line 28 *et seq*) Thus, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to employ a liquid copolymer of tetrafluoroethylene and perfluorovinylethersulfonic acid for reasons such as enhancing ionic conduction within the electrode.

Issue 3: Claims 15-17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Serpico et al. in view of Dupont Zonyl reference as applied to claims 7-11, 13, 14, 18, and 20 above, in view of Samuels et al.

The teachings of Serpico and the Dupont Zonyl reference are discussed above.

Serpico does not explicitly teach roughening the surface of the membrane prior to applying the catalyst ink. However, Samuels teaches roughening the surface of the membrane using silicon carbide prior to catalyst deposition. Thus, at the time the invention was made, it would have been obvious to the skilled artisan to employ roughening of the membrane for

reasons such as increasing its surface area, thereby enhancing surface sites for catalyst ink adhesion.

(11) Response to Argument

Response to arguments with respect to Issue 1, claims 7-11, 13, 14, 18 and 20

Appellant submits that Serpico does not recognize the importance of controlling particle size within a narrow range and that disclosed broad range of sizes are equally suitable. Appellant appears to submit that Serpico, even when taken in combination with the Dupont Zonyl reference, teaches away from the claimed invention, "to do so would involve ignoring what Serpico teaches". In reply, the examiner maintains that optimization of the particle size in Serpico is *prima facie* obvious to the skilled artisan when taken in view of the Dupont Zonyl reference, the latter reference relied upon solely to show that the particle size of PTFE fluoroadditives polymers is a result-effective in directly affecting dispersion stability of the formulation. *In re Boesch,* 617 F.2d 272, 205 USPQ 215 (CCPA 1980) Appellant has not shown on the record the criticality of the claimed range of 1-4 microns for the PTFE fluoroadditive to obviate this basis for rejection. The claimed invention is absent of a showing of unexpected results for the claimed range of 1-4 microns for the fluorocarbon polymer. *In re Woodruff,* 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) As a matter of clarification, Appellant also appears to take the position that it would not have been obvious for one skilled in the art to "merely substitute the particles in the Serpico reference... with those in the Zonyl reference". The examiner notes, however, that the present rejection is not relying on substitution of any portion of Serpico with any tangible teachings taken from the Dupont Zonyl reference, e.g. substitution of one fluoropolymer for another. The rejection based on Serpico in view of the

Dupont Zonyl reference is maintained to the extent that the Dupont Zonyl reference further renders obvious to the skilled artisan optimization of the particle size of the fluorocarbon polymers in Serpico's invention, particularly within the range already disclosed in Serpico by way of preferred ranges and exemplary teachings.

To the contrary, it is the examiner's position that Serpico's disclosure, especially in view of the Dupont Zonyl reference, falls short in teaching away from the claimed range of 1-4 microns. The examiner acquiesces to Serpico's teaching of a "preferred size" of 50 microns to 500 microns from the disclosed broader range of 0.05 micron to 500 micron for the fluorocarbon polymer. (col. 2 line 58) However, Serpico's stated preference for a 50 micron to 500 micron fluorocarbon polymer is not deemed restrictive to sizes outside of that range which may otherwise be employed. As discussed above, Example 1 of Serpico actually employs a Dupont 30B fluorocarbon polymer of particle size ranging from 0.05 microns to 0.5 microns. Thus, while Serpico may express a preference for a fluorocarbon polymer of 50 micron to 500 micron in size, at the same time the patentees provide motivation for the skilled artisan (by way of specific example) to focus on particle sizes at the bottom of the "preferred" range and to explore particle sizes below that range.

Appellant submits that the examiner is incorrect in categorizing Serpico et al. and the Dupont Zonyl reference as mutually relevant. In reply, the examiner maintains that both references employ a fluoropolymer particle as a coating additive within an aqueous dispersion and at least on that basis, the references are mutually relevant. As to arguments directed to the Zonyl particles in Appellant's invention not performing the role of a binder (unlike in Serpico wherein the fluoropolymer particles are alleged to melt-flow and coat the catalyst particles), as

set forth in the October 1, 2002 Advisory Action these arguments are not persuasive, as limitations precluding such melt-flow and coating of the catalyst particles in Appellant's claimed invention are outside the scope of the present claims.

Response to arguments with respect to Issue 2, claim 12, and Issue 3, claims 15-17 and 19

The examiner notes that arguments against Kindler and Samuels et al. appear to be directed solely to these references failing to remedy alleged differences between Serpico and the Dupont Zonyl reference. Serpico in view of the Dupont Zonyl reference are maintained for the reasons set forth above and the combined teachings are believed to teach or at least suggest the presently claimed invention, thereby negating any alleged differences. Additionally, it appears to the examiner that the apparent acquiescence to the teachings of Kindler and Samuels et al. is why the rejection of claims 7-20 have been submitted by Appellant to stand or fall together as one collective grouping of claims.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Julian A. Mercado
February 19, 2003

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DuPont

Zonyl®

fluoroadditives

DuPont *Zonyl*® PTFE fluoroadditives for ink, coatings, and overprint varnishes (OPVs) offer a wide range of enhanced performance attributes including:

- Improved abrasion, scratch, and scuff resistance
- Decreased surface tension
- Increased slip, surface lubricity, and block resistance
- Improved chemical resistance
- Improved stain resistance
- Improved scrub resistance

DuPont fluoroadditives are the highest quality products in the industry. DuPont's manufacturing process leads to more consistent products, which translates to more consistency in performance and appearance for our customers' products. There are many grades that have been specifically developed for the coatings and ink industry as displayed in **Table 1**.

Ink and OPV Product Recommendations

Lithographic: *Zonyl*® MP 1200 or *Zonyl*® MP 1400 if FDA approvals are required.

Flexographic: *Zonyl*® MP 1200 or, if dispersion stability is a problem, *Zonyl*® MP 1100 or *Zonyl*® TE-3667N.

Gravure: *Zonyl*® MP 1400 or, if dispersion stability is a problem, *Zonyl*® MP 1100 or *Zonyl*® TE-3667N.

Zonyl® MP 1200 is the optimum particle size for lithographic and flexographic applications. *Zonyl*® MP 1400 is an FDA-approved fluoroadditive. However, its particle size is larger than *Zonyl*® MP 1200, so it will be less effective (at the same concentration) as a wear agent and more likely to settle.

Zonyl® MP 1100 has a fine particle size and the most functionality (i.e., acid end groups) of the DuPont fluoroadditives. Therefore, it will be easier to disperse and maintain dispersion stability. Because of its small particle size, it may require higher concentrations than *Zonyl*® MP 1200 to obtain the same wear performance.

Other products to consider are:

Zonyl® TE-3667N aqueous dispersion for water-based inks and OPVs that require high gloss.

Zonyl® TE-5069AN, which is the smallest particle size of any PTFE fluoroadditive available in the marketplace. If milled adequately, *Zonyl*® TE-5069AN will allow the highest possible clarity and gloss. If your formulation is water based, consider *Zonyl*® TE-5070AN, which is the water-based analog of *Zonyl*® TE-5069AN.

Table 1
Grind/Particle Size

	Grind		Typical Particle Size			
Zonyl® Grade	NPIRI*	Hegman	>90%	Average	<90%	Primary
MP 1200	1	8	1	3	8	—
MP 1400	4	7	3	9	20	—
MP 1100	1	8	0.3	3	8	0.20
MP 1600N	1	8	—	7	—	0.20
TE-3667N	1	8	—	Aqueous Dispersion	—	0.20
TE-5069AN	1	8	—	12	—	0.08
TE-5070AN	1	8	—	Aqueous Dispersion	—	0.08
TE-5119A**	1	8	—	10	—	0.40

* The results shown are expected measurements after adequate milling during typical ink formulation preparation.
** *Zonyl*® TE-5119A is a fluorinated polyolefin.

DUPONT

Zonyl®
fluoroadditive

Zonyl® Fluoroadditives -- Physical Properties

To select the right Zonyl® product for your application, use our <u>Products Selection Guide!</u>

Typical Properties of Zonyl® Micronized Powder and Aqueous Dispersion Fluoroadditives
(Typical Properties only -- not suitable for specifications)

Property	Method	Units	MP1000	MP1100	MP1200	MP1300
Particle Size						
90% of the particles are greater than:	See Note 1	µm	3	0.3	1	3
Average	See Note 1	µm	12	4	3	12
90% of the particles are smaller than:	See Note 1	µm	30	8	9.0	25
Primary Particle Size	Microscopy, SEM	µm	0.2	0.2	--	--
Specific Surface Area	Nitrogen Adsorption	m^2/g	7 - 10	7 - 10	1.5 - 3.0	1.5 - 3.0
Apparent (Bulk) Density	ASTM D1457	g/L	450 - 600	200 - 425	375 - 525	350 - 500
Polymer Specific Gravity (Relative Density)	See Note 2	--	2.2 - 2.3	2.2 - 2.3	2.2 - 2.3	2.2 - 2.3
Melting Peak Temperature	ASTM D1457	°C (°F)	325±10 (617±18)	320±10 (608±18)	320±10 (608±18)	325±10 (617±18)
Temperature Service Range	ASTM D1457	°C (°F)	-190 to 260 (-310 to 500)	-190 to 260 (-310 to 500)	-190 to 260 (-310 to 500)	-190 to 2((-310 to 5
Compliance with U.S FDA Regulations for use in Contact with Food (See Note 3)	FDA Protocol	--	Yes	No	No	Yes
Food Approval EEC Countries	--	--	Yes	No	No	Yes
Solids (Aqueous Dispersions only)	--	--	--	--	--	--
pH (Aqueous Dispersions only)	--	--	--	--	--	--

Note 1: By Leeds and Northrup Microtrac II particle size analyzer.

Note 2: Value not measured. Calculated assuming a void free molding at 100% crystallinity.

Note 3: Important: Before adoption, see DuPont Bulletin H-52475-1 for referral to specific U.S. Federal Food and Drug Administration amendments permitting use of Zonyl® Fluoroadditives as articles or components of articles intended for use in contact with food. Some limitations and conditions of use apply.

Note 4: TE-3667N can comply with FDA requirements if sintered/baked at temperatures above 340°C for 2 - 3 minutes or longer.

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If you have questions or comments, please contact us by e-mail or by phone.

DUPONT

Teflon® PTFE 30B

fluoropolymer resin

Aqueous Dispersion

Brand

Teflon® is a registered trademark of DuPont for its brand of fluoropolymer resins, which can only be licensed by DuPont for use in approved applications. Customers who wish to use the *Teflon*® trademark in connection with DuPont products under license from DuPont should contact (800) 262-2745. Without a license, customers may not identify their product as containing *Teflon*®, but may refer to the resin as PTFE fluoropolymer dispersion 30B.

Description

Teflon® PTFE 30B fluoropolymer resin is a negatively charged, hydrophobic colloid, containing approximately 60% (by total weight) of 0.05 to 0.5 µm polytetrafluoroethylene (PTFE) resin particles suspended in water. Seen as a milky white liquid, it also contains approximately 8% (by weight of PTFE) of a nonionic wetting agent and stabilizer. Viscosity at room temperature is approximately 20 cP. Nominal pH is 10.

.05 -.5 micron

Compared with other grades of PTFE dispersions, *Teflon*® PTFE 30B is especially formulated to provide void-free coatings with enhanced surface smoothness and gloss. It imparts many of the unique properties of PTFE resin to porous structures.

When properly processed, the PTFE resin in *Teflon*® PTFE 30B exhibits the superior properties typical of the fluoropolymer resins: retention of properties after service at 260°C (500°F), useful properties at –240°C (–400°F), chemical inertness to nearly all industrial chemicals and solvents, and low friction and antistick surfaces. Dielectric properties are outstanding and stable with frequency and temperature. Refer to **Table 1** for typical property data.

Typical End Products

Teflon® PTFE 30B is used for coated glass fabric for high-performance industrial or food conveyor belting and nonadhesive separator sheets for laminating or press blankets requiring high-quality surface finish; electrical insulation for wire, printed circuit boards, and rotating equipment; cast film for capacitors or chemical barriers; and surface coatings for other substrates.

FDA Compliance

Properly processed products (sintered at high temperatures common to the industry) made from *Teflon*® PTFE 30B resin can qualify for use in contact with food in compliance with FDA Regulation 21 CFR 177.1550. Products made from unsintered dispersion do not comply.

Processing

PTFE resin does not respond to solvent or melt processes. A dispersion of PTFE particles provides an alternate method for making coated or impregnated products.

Conventional dip or flow techniques can be used for coating or impregnating other products with *Teflon*® PTFE 30B. The resin particles can be consolidated by heat into a coherent matrix or coating or left as particles to influence the properties of a finished product.

A continuous PTFE resin coating on woven fabrics can be made by dip coating. Successive passes must be used to build up thickness slowly and without cracks. *Teflon*® PTFE 30B fluoropolymer provides good rewetting on each pass and void-free buildup suitable for more demanding electrical and chemical service applications. Each coating layer is usually dried to remove water (typically at 120°C [250°F]), baked to remove the wetting agent (typically at 290°C [554°F]), sometimes calendered, and finally heated above the crystalline melting point of the resin particles (approximately 337°C [639°F]). Glass, PTFE, *Nomex*® aramid fiber, *Kevlar*® aramid fiber, or other high-temperature resistant fibers must be used.

Products utilizing entrained PTFE resin particles only for their lubricating or hydrophobic properties are dried and baked, but not heated above the crystalline melting point of the particles. For example, rope-like products, such as shaft packings, can be made from braided fabrics in a variety of cross sections. The dispersion wets internal surfaces and promotes penetration of the extremely small particles. The unmelted particles are sheared and retained as an impregnant, even when compressed in service and exposed to steam or chemicals. Unmelted particles also can improve flexibility and flex life. High-temperature resistant fibers are not necessarily required in these applications.

Other solid or liquid ingredients can be added to *Teflon*® PTFE 30B to provide specific processing or finished product behavior.

Safety Precautions

WARNING!

VAPORS CAN BE LIBERATED THAT MAY BE HAZARDOUS IF INHALED.

Before using *Teflon*® PTFE 30B, read the Material Safety Data Sheet and the detailed information in the "Guide to the Safe Handling of Fluoropolymer Resins," latest edition, published by the Fluoropolymers Division of The Society of the Plastics Industry—available from DuPont.

Open and use containers only in well-ventilated areas using local exhaust ventilation (LEV). Vapors and fumes liberated during hot processing, or from smoking tobacco or cigarettes contaminated with *Teflon*® PTFE 30B fluoropoly-mer resin, may cause flu-like symptoms (chills, fever, sore throat) that may not occur until several hours after exposure and pass within about 24 hours. Vapors and fumes liberated during hot processing should be exhausted completely from the work area; contamination of tobacco with polymers should be avoided.

Mixtures with some finely divided metals, such as magnesium or aluminum, can be flammable or explosive under some conditions.

Teflon® PTFE 30B contains additives in the aqueous phase that are irritants. In case of skin contact, flush with water immediately. In case of eye contact, flush with water immediately and get medical help.

Storage and Handling

The dispersion particles in *Teflon*® PTFE 30B will settle on prolonged standing or on heating above 66°C (150°F). They usually can be redispersed by mild agitation. Drums may be rolled or the product stirred gently just prior to use. The dispersion must be protected from freezing, which will cause irreversible settling.

Ammonium hydroxide is used by DuPont to set pH to 10 at the time of shipment. High ambient temperatures can deplete the ammonia level and reduce the pH. Declining pH eventually favors bacterial growth, which causes odor and scum. The pH should be measured and maintained between 9.5 and 10.

Both very high and very low temperatures may be detrimental. Dispersions must not be allowed to freeze. The optimum storage temperature range is 7–24°C (45–75°F), with temperatures low in the range preferred. Storage at 7–32°C (45–90°F) is acceptable within nominal shelf life for standard dispersions. If dispersions are to be stored for extended periods beyond their nominal shelf life, low-temperature storage is especially desirable because the particles are harder at lower temperatures and, therefore, are less likely to stick together as they settle.

High-speed stirring, pumping, or any other violent agitation must be avoided to minimize sheared particles or coagulation and to minimize foaming. Ideally, the dispersion should be conveyed by gravity from storage to processing stations.

Storage and handling areas should be clean. Keep dispersion drums closed and clean to avoid both contamination and coagulation by drying at the liquid surface. High processing temperatures will cause even very small foreign particles to become visible or to make defects in finished products. Good housekeeping and careful handling are essential.

Table 1
Typical Property Data for *Teflon*® PTFE Fluoropolymer Resin Dispersion Grade 30B

Property	ASTM Standard	Unit	Nominal Value
Percent PTFE Resin Solids	D4441	%	60
Weight of PTFE Resin Solids	D4441	kg/m^3 (lb/gal)	900 (7.5)
Specific Gravity of Dispersion	D4441	—	1.5
Average Dispersion Particle Size	—	µm	0.22
pH (min.) of Dispersion	E70	—	9.5
Viscosity of Dispersion (at 25°C [77°F])	D2196	cP (Pa·sec)	20 (0.02)
Melting, Peak Temperature			
Initial	D1457	°C (°F)	337 (639)
Second	D1457	°C (°F)	327 (621)

Notes: *Teflon*® PTFE 30B is ASTM D4441-98, II 7B.
Typical properties are not suitable for specification purposes.

Packaging

Teflon® PTFE 30B is packaged in 19- and 114-L (5- and 30-gal) nonreturnable drums and 1037-L (275-gal) recyclable containers.

Freight Classification

Teflon® PTFE 30B, when shipped by rail or express, is classified "Plastics, Synthetic, Liquid, NOIBN." Resin shipped by truck is classified "Plastics, Materials, Liquid, NOI."

For more information on Fluoroproducts: (302) 479-7731

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CAUTION: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

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